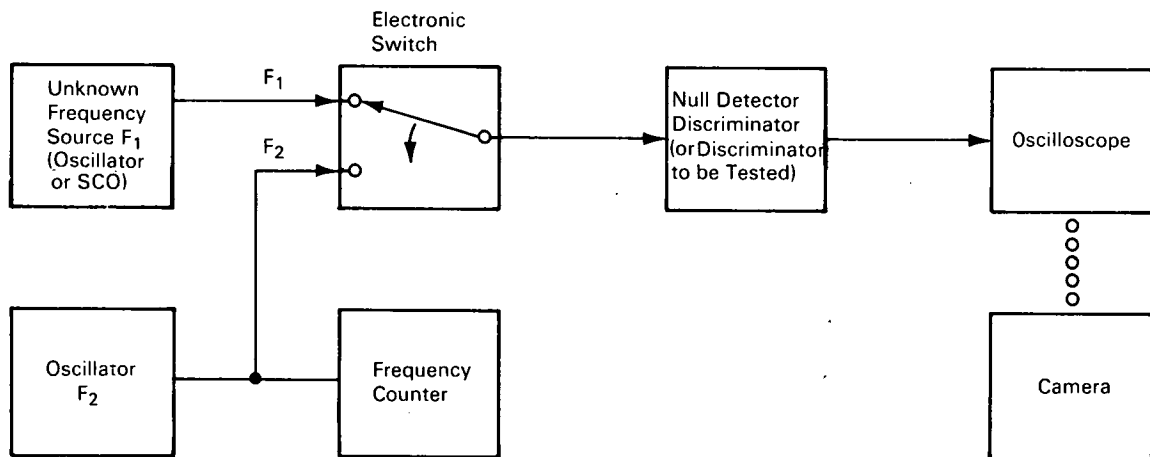


NASA TECH BRIEF



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Dynamic Linearity Measurement Technique



Static linearity of a frequency modulated (FM) sub-carrier oscillator (SCO) and an FM discriminator is quite easily measured. There has been, however, no adequate method or technique that will independently measure the dynamic linearity of an FM SCO or discriminator. The basic problem is to measure a particular frequency that is not held constant over a specific time interval.

A technique has been devised that uses an FM discriminator as a high gain null detector to produce an error signal as two signals, one of known frequency, the other of unknown frequency, are electronically switched to the discriminator input. This analog error signal becomes zero when both input signal frequencies coincide.

Considering the figure, which shows the equipment and its arrangement, when both frequency sources are at the same frequency ($F_1 = F_2$), the net output from the discriminator will be zero. When the sources are at different frequencies ($F_1 \neq F_2$), a square wave will appear at the discriminator output, of amplitude directly proportional to the frequency difference

($F = F_2 - F_1$) of the two oscillators and of repetition rate directly proportional to the electronic switch speed. The amplitudes of the signal generator outputs are unimportant because of the broad limiting action of the discriminator. The discriminator is fully limiting with an output of 5 mv rms or greater.

Note:

Inquiries concerning this innovation may be directed to:

Technology Utilization Officer
Kennedy Space Center
Kennedy Space Center, Florida 32899
Reference: B68-10290

Patent status:

No patent action is contemplated by NASA.

Source: Karl Merz and Leon Morrell
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Category 01